PSG 103, *Sipyloidea* sp. from Thailand.

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Note on culture origin and identity by P.E. Bragg.

Abstract
This paper describes the male and female adults of *Sipyloidea* sp. (PSG 103) and diagrams of each are present. It gives a general report of nymphs, defensive features and foodplants as well as a descriptive section on rearing techniques. An interesting difference in eggs is noted with the description of two variations both of which are figured. Three tables with comprehensive data of male and female lengths, instar lengths and nymphal growth are included.

Key words
Phasmida, *Sipyloidea* sp., Thailand, Rearing, Foodplants, Eggs, Growth rate.

Culture origin and Identification

This species was originally imported from Khao Yai National Park Thailand by Heinz van Herwaarden in August 1988 and was added to the PSG culture list as PSG 103 in Spring 1990. In his report on the species collected at the National Park, Heinz referred to this as "species eight" and illustrated the male, female and egg (Herwaarden, 1989: 17, figs 8a-8c). It does not seem to be a named species although the males are similar to a species described by Westwood from Singapore, and the females and eggs are similar to an apparently undescribed species from Mt Kinabalu in Sabah (the males of this latter species are quite different). The genus *Sipyloidea* Brunner, 1893, as treated by Redtenbacher (1908) is large in comparison to other phasmid genera and contains a rather diverse assortment of species, some of which appear to be misplaced. To further complicate matters, there are other genera which are, at least superficially, quite similar.

Females (figure 1)

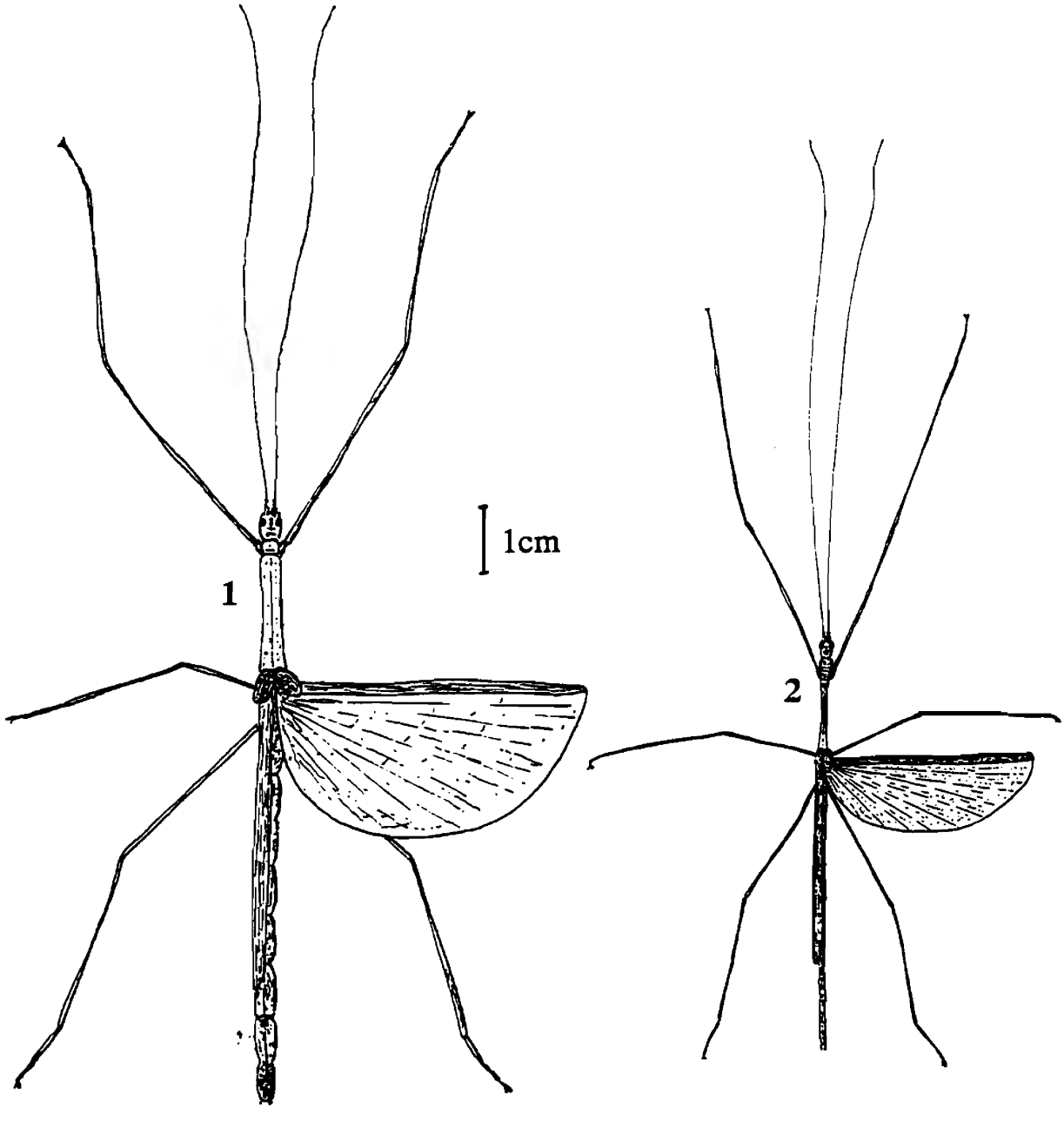
The females of this species are typical of the genus *Sipyloidea*. The females in captivity can have body lengths reaching 87mm, although other members have reported lengths up to 91-93mm. Table 1 presents a full set of measurements that have been recorded from a set specimen. The antennae are coloured a light straw-brown, with the first two segments being about twice the diameter of the rest. Typical body colouring is a medium brown to straw with darker patches on the head, pronotum and mesonotum giving a mottled appearance. The heads of my specimens had three narrow dark stripes running lengthways: two running from the pronotum to each eye, and one running in the middle of the fore head from the pronotum to the antennae. The latter stripe appears to continue the pronotum and mesonotum and stops at the elytra. There are no spines on the head or thorax but the texture of the mesonotum is slightly rough, similar to that of *Sipyloidea sipylus* (Westwood). The metanotum and abdomen are straw coloured, smooth in texture and have no pattern: there are no markings on the abdomen. The terminal segments are large, especially during egg production. The cerci are just visible, are small in size and flattened in shape.

The legs are all long and narrow. The fore and mid legs are a light straw-brown colour but are heavily mottled, giving the impression of being darker. In my experience the hind legs are of slightly deeper colour: a medium brown with quite dark markings.

There is a pair of well developed wings that span some 47mm. They are very pale brown and are devoid of the red veins that give the pink wing appearance of *Sipyloidea sipylus*. They are delicate and transparent.

Males (figure 2)

Males of this species are extremely pretty and appear fragile compared to the much larger females. In captivity they can reach body lengths of 61mm and recordings of 69mm have



Figures 1 & 2. PSG 103 adults: **1**, Female; **2**, Male.

been reported. Table 1 gives full measurements of a set specimen. Antennae are the same length as the insect's body with the first two segments being a greater diameter than the others. The colour of the antennae is dark green to brown. Typical thorax and head colouring is dark green. The male has two stripes running along each side of the head, but appears to lack the stripe on the forehead which is quite pronounced on the female. However it is heavily mottled which gives a dark appearance.

The pronotum and mesonotum are smooth and devoid of any spines. There is a black and white stripe running in parallel on either side of the pronotum and mesonotum. These lines stop at the elytra. The mesonotum and abdomen are a slightly lighter colour than the head, being medium green. Beneath the wings the top side of the abdominal segments 1-5 are a medium brown colour. The abdomen has a shiny appearance and no mottled effect. The cerci project beyond the terminal segments of the abdomen and are pointed but flattened

in shape.

The fore and mid legs are the same colour as the head and slightly mottled. The hind legs are more brown in colour with the hind tarsi appearing medium brown. All legs are smooth, narrow and long in length relative to body size.

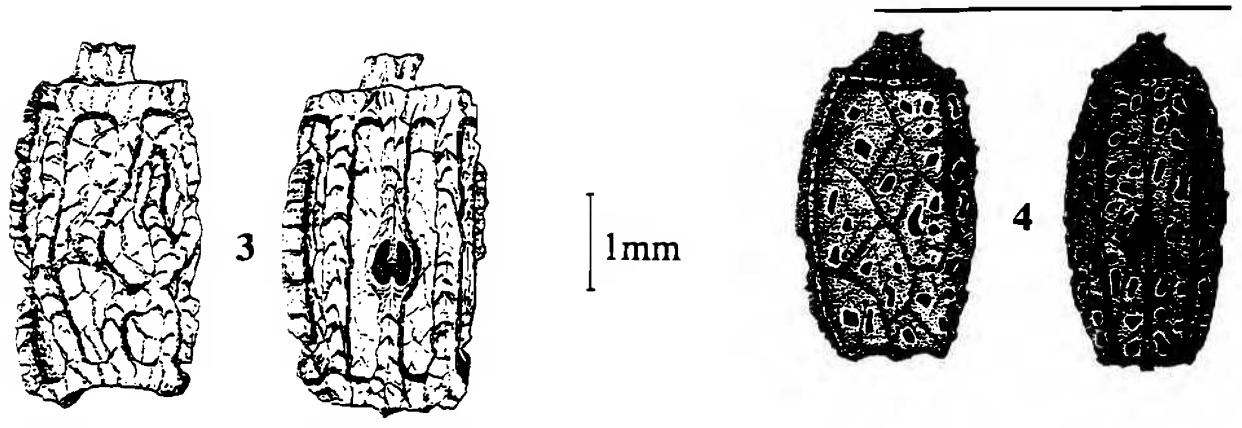
Adult sizes (mm)	Female	Male
Body length	87	61
Antennae	74	60
Head	4	2.6
Pronotum	3.5	3
Mesonotum	15	11
Metanotum	11	7
Abdomen	54	38
Fore femur	26	20
Fore tibia	24	19
Fore tarsus	11	7
Mid femur	15	13
Mid tibia	14	12
Mid tarsus	7	6
Hind femur	21	19
Hind tibia	20	18
Hind tarsus	10	8
Body width (metanotum)	4.2	2
Hind wing length	47	31
Fore wing length	6.5	3.5

Table 1. Measurement of adults.

Like the females they have a well developed pair of wings, they span 33mm. They are devoid of the brown coloration and are therefore almost colourless. The costal region of the hind wings are very brightly coloured with green and magenta-brown stripes. The wings appear very delicate.

Eggs (figures 3 & 4)

The eggs are rectangular to oval with the following dimensions: length 3.6mm, width 1.8mm and height 1.6mm. The colour is cream to medium brown. The operculum is of the same colour but the capitulum is often slightly darker. The micropylar plate is significantly darker than the rest of the egg, almost black in colour, and takes the form of a small oval, sometimes with indentations formed by the material of the capsule. The contents of the eggs are a greeny-cream colour.



Figures 3 & 4. Lateral and dorsal views of eggs: **3**, Original-type egg; **4**, "B-type" egg.

The eggs described are of my first generation. I kept the eggs at room temperature in a plastic container. The humidity was about 60-70% and the eggs proved easy to keep. I had a 75% hatch rate. From these eggs I managed to rear three nymphs to adulthood - two females, one male. From the two females I received two different variations of eggs. One female laid eggs similar to those already described (see figure 3). The other female laid "B-type" eggs that were quite different (see figure 4). These eggs are slightly smaller with measurements of length 3.2mm, width 1.3mm and height 1.6mm. The eggs are much darker in colour, almost black. They have a smooth texture, devoid of the pits and projections of the original eggs. The operculum and capitulum are of similar shape but have a more shrivelled appearance. The micropylar plate is almost identical but less pronounced due to it being the same colour as its surroundings. The contents are similar being green in colour. Each female laid about 2.25 eggs per 24 hours and I incubated them in conditions similar to the first generation. With the original type eggs I had a hatch rate of 77% (n=82), and with the "B-type" eggs I had a hatch rate of 21% (n=104).

Nymphs (figure 5)

I have found that eggs can hatch at any hour but do so mainly at night between 2300 and 0600 hours. When newly hatched nymphs have a body length of 16mm. The body colour is a uniform bright green, darkening only slightly as the nymphs grow older. This is probably partly due to feeding and the darkening effect this has on the body. The mottling on the thorax of adults is apparent in the third to fourth instars.

Nymphs can be sexed in the third instar due to a difference in colour: males are more of a metallic blue-green whereas females remain bright green. A characteristic of this

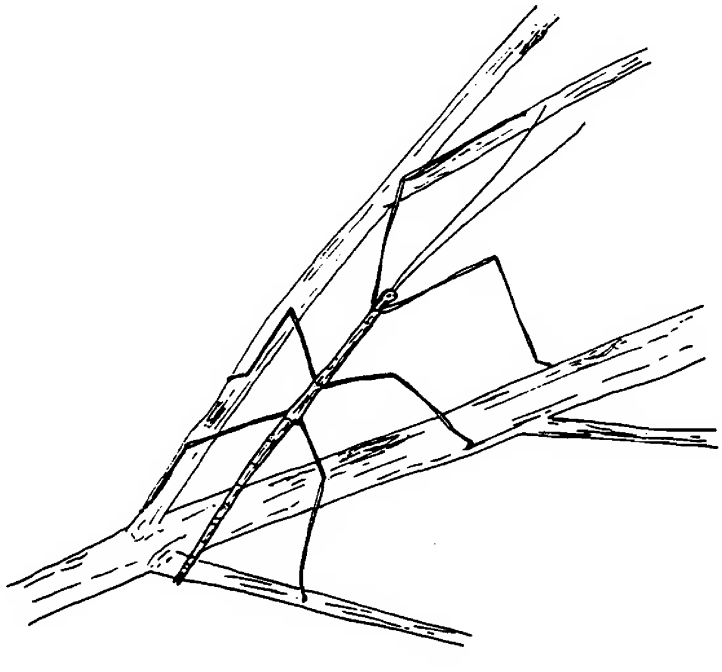


Figure 5. PSG 103 nymph.

species is that the nymphs lie along the veins and midribs of the leaves, providing very good camouflage and making them very difficult to see. They often rest with their antennae at a 90° angle to their body.

There seem to be no apparent differences between the nymphs of the original type of egg and those established from the "B-type". I find this interesting as the eggs were so different. However there was a much higher rate of deformity and mortality among the nymphs hatching from "B-type" eggs giving me very few healthy nymphs.

Measurements (mm)	Instar No.											
	1st		2nd		3rd		4th		5th		6th	
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
Body length	16	16	24	24	32	32	42	40	54	51	69	-
Antennae	17	17	22	21	28	26	37	36	50	44	58	-
Fore leg	14	14	19	19	24	23	33	32	43	38	48	-
Mid leg	10	10	14	13	18	16	23	22	29	25	32	-
Hind leg	17	17	20	18	25	24	34	33	38	39	43	-
Body width (metanotum)	0.75	0.75	1	1	1.2	1	1.5	1.4	2	1.75	2.1	-

Table 2. Measurement of nymphs.

Table 2 shows the measurements of nymphs at each instar. These recordings were taken from one individual of each sex from the first generation reared. Checks were made with other insects from the culture to ensure the readings were accurate. Table 2 shows that both sexes grow at much the same rate and it is only the fact that males have one less instar than females that they are finally significantly smaller in size. The length of the instars of each sex is shown in Table 3. This data was taken from the same two individuals and shows that on average the male had longer instars than the female.

Instar No.	Duration (days)	
	Female	Male
Eggs	59	59
1	27	30
2	24	31
3	25	23
4	23	32
5	35	31
6 (♀) / adult (♂)	34	88
Adult	93	-

Table 3. Length of instars.

Defence

Defence mechanisms of this species are mainly passive: lying along the veins and midribs of leaves. When disturbed, many forms of active or secondary defence occur. Both nymphs and adults attempt to escape by falling or walking away. I have experienced female adults hurling themselves to the floor of the cage. This may be similar to the "push-back fright response" as described by Bradburne (1993). Although females have well developed wings, Bradburne explains that if the insect has less than 30cm to drop, it declines to use its wings. However both adult sexes are active fliers and this is probably their main form of defence.

Males in particular are very capable fliers and "they easily manage to dodge around obstacles" (Bradburne, 1993). I can only believe that this is a great asset in the wild when they have to defend themselves against predators.

Foodplants

This species readily accepts hawthorn (*Crataegus* sp.), bramble (*Rubus* sp.), rose (*Rosa* sp.), eucalyptus (*Eucalyptus* sp.), raspberry (*Rubus* idaeus), lime (*Tilia* sp.). The female adult especially gorges itself on bramble flower petals. It could be that it is attracted to coloured or scented plants. Flower eating has also been recorded in *Sipyloidea sipylus* by Adams (1990). It may therefore be that this feature occurs across the whole genus.

The above list are the only plants tried apart from ivy (*Hedera* sp.) and apple (*Malus* sp.) both of which were rejected.

Rearing

Apart from the difficulties incurred during the hatching of the "B-type" eggs I found this to be one of the easier species to rear and have successfully reared two generations. I have heard of no reports of difficulty in rearing this species.

From initially receiving a total of eight eggs to start my culture, I kept them in conditions as previously described. They commenced hatching on 30-11-94 with a 75% success rate achieved. From these 6 nymphs three adults were raised, one male and two females. They reached their adult stage on 29-4-95, 17-5-95 and 18-5-95 respectively. I first noticed copulation occurring on 20-5-95 and the first eggs were laid on 5-6-95; these were of the "B-type".

Approximately 150 eggs were laid by each female at an average rate of 2.25 eggs per 24 hours. Laying occurred until death. No apparent change in egg size occurred as death of the female approached, a contrast to species such as *Extatosoma tiaratum* (Macleay) where shrinkage occurs. The male died on 26-7-95 and the females died on 8-8-95 and 18-8-95. Having only so far reared one generation to the adult stage I cannot be sure they lived a full lifespan although I am unaware of any reason for them to have died prematurely.

I kept this species in wood and gauze, or plastic cages, and spray them with water four times a week. I have found that spraying was not critical and that they can survive in a fairly dry atmosphere at normal room temperature.

References

Adams, M. (1990) Flower eating and defence in *Sipyloidea sipylus*. *PSG Newsletter*, **43**: 13.

Bradburne, R.P. (1993) Defensive and flying behaviour in *Sipyloidea* sp. (PSG 103). *Phasmid Studies*, 2(2): 56-58.

Herwaarden, H. van (1989) Phasmidae from Thailand, Part 2: Species found in Khao Yai National Park. *PSG Newsletter*, **41**: 15-19.

Redtenbacher, J. (1908) *Die Insektenfamilie der Phasmiden*, Volume 2. Leipzig.